

Response Under 37 CFR 1.116
Expedited Procedure
Examining Group 1722
Appl. No. 10/717,018
Amdt. AF dated December 21, 2005
Reply to final Office Action of 09-21-2005
Attorney Docket No. 1217-032261

REMARKS

Claims 1-7 are pending in the application. Claims 1-7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 3,359,077 to Arst (hereinafter "Arst"). A new dependent claim 8 has also been added herein which is discussed in greater detail below.

Applicants' undersigned attorney wishes to thank the Examiner for the courtesy of the telephone interview conducted December 19, 2005. During the course of the interview, the Applicants' undersigned attorney discussed with the Examiner the Office Action of September 21, 2005, as well as the presently-pending claims. The Examiner's attention was called to the statement contained on page 3, first paragraph of the Office Action, "The sole difference between the instant claims and the prior art is the material of the cover plate and thermal conductivity of the plate." It was pointed out to the Examiner that this is certainly not the sole difference between the instant claims and the prior art. In this regard, the Examiner's attention was directed to the portion of claim 1 which defines the single crystal pulling chamber as being defined by a single crystal pulling region which vertically extends from an upper end of the crucible to a height that an upper end of the single crystal of a metal fluoride to be grown reaches at the end of pulling, terminating at a location below the ceiling board. This claimed structure is contrasted to the crystal pulling apparatus disclosed in Arst in which the insulation cover 17 is spaced in close proximity to the top of the crucible 30. It is clear that a single crystal being grown in the apparatus of Arst would extend above the insulation cover 17 thereof. In other words, Arst does not disclose or suggest a crystal pulling chamber which is surrounded by a heat insulating wall and a ceiling board of controlled thermal conductivity which is vertically spaced from the top of the

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crucible a distance such that the entire length of the grown crystal is contained therein for the purpose of controlled slow cooling, which is of utmost importance in avoiding cracks in single crystals of a metal fluoride.

The Examiner's attention is also directed to the last paragraph of claim 1 which specifies that the ceiling board has a coefficient of thermal conductivity in a direction of a thickness of the ceiling board of 1000 to 50000 W/m²·K. As discussed in the specification on page 24, lines 8-18, the controlled coefficient of thermal conductivity in the ceiling board provides controlled heat radiation from the ceiling board so that the single crystal pulling region is cooled slowly both in the radial and vertical directions. As a result, the uniformity of temperature within the pulling region is improved remarkably. Hence, a single crystal is cooled slowly and uniformly in the single crystal pulling region 38 of Fig. 1 resulting in stable growth of the crystal. The claimed apparatus thus makes it possible to successfully grow single crystals of a metal fluoride such as calcium fluoride which are prone to crack generation during cooling.

In summary, it is clear that Arst does not disclose or suggest the single crystal pulling region nor the ceiling board of controlled thermal conductivity in the thickness direction as set forth in claim 1.

Claim 1 has been amended to correct a typographical error.

Claim 7 has been amended to correct a minor grammatical error.

Applicants have added new claim 8 which depends from claim 1. Support for claim 8 may be found on page 29, line 16 bridging to page 30, line 5. More specifically, new claim 8 (as can be seen in Fig. 1) further defines the single crystal pulling apparatus of claim 1 as including a cylindrically-shaped partition wall 50 positioned circumferentially between the melting heater 24 and the crucible having a top edge which extends above the melting

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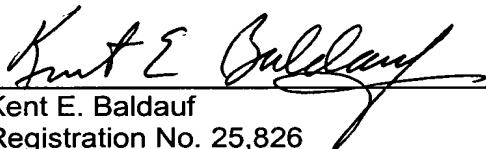
heater and further includes an annularly-shaped lid member 52 which closes the gap between the partition wall 50 and the heat insulating wall 26 at the upper edge to thus minimize heat from the melting heater being radiated upwardly. The partition wall 50 also serves to provide more uniform radiant heat from the heater 24. Clearly, no such structure is disclosed or suggested in Arst.

Pursuant to the above amendments and remarks, it is deemed that claims 1-8 are in condition for allowance, and the Examiner's reconsideration and favorable action are respectfully requested.

Respectfully submitted,

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